

NASA/SP—1999-7011/SUPPL484
February 8, 1999

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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Typical Report Citation and Abstract

- ❶ 19970001126 NASA Langley Research Center, Hampton, VA USA
- ❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
- ❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
- ❹ Mar. 1996; 130p; In English
- ❺ Contract(s)/Grant(s): RTOP 505-68-70-04
- ❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
- ❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10° to 50°, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65° swept forebody serrations tended to roll together, while vortices from 40° swept serrations were more effective in generating additional lift caused by their more independent nature.
- ❽ Author
- ❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

1. Document ID Number; Corporate Source
2. Title
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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 484)

FEBRUARY 8, 1999

51

LIFE SCIENCES (GENERAL)

19990009100 Institute of Space Medico-Engineering, Beijing, China

A Study on the Auditory Evoked Middle Latency Response in Guinea Pigs

Zhao, Lun, Institute of Space Medico-Engineering, China; Duan, Ran, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 68-70; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

The changes of Middle Latency Response (MLR) to auditory stimuli through different band pass filters and different pilot areas in guinea pigs were studied. The results were: the latent period with narrow band pass filter was different from that with wide band pass filter. The difference among MLR at temporal lobe, occipital lobe, parietal lobe, and frontal lobe was marked. These data indicate that the origins of the waves are different and the surveying conditions may influence the recording of MLR.

Author

Auditory Stimuli; Physiological Responses

19990009158 Yamagata Univ., Faculty of Engineering, Japan

Consensus Structure in Translation Initiation Region in Escherichia Coli Genes by Principal Component Analysis

Kanaya, Shigenhiko, Yamagata Univ., Japan; Ishikawa, Takuma, Yamagata Univ., Japan; Kudo, Yoshihiro, Yamagata Univ., Japan; Bulletin of Yamagata University (Engineering); Jan. 1994; ISSN 0085-834X; Volume 23, No. 1, pp. 55-66; In English; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Three major structural features, which may be involved in translation initiation, are drawn from examination of similarity of occurrences of 64 kinds of trinucleotides (called triplets) in translation initiation regions (TIRs) of Escherichia coli by principal component analysis. (1) In the vicinity of 11-base upstream of translation initiation sites (TISs), there are many 3 purine triplets (especially AGG, GGA, and GAG) except AAA, and extremely few C rich triplets. This suggests that most of the 3 purine triplets have no C rich triplets to be partners to form secondary structures, and therefore can go to access to ribosomes. (2) Three triplets (AAA, UAA, and UUU) are generally desirable in the whole region of TIS. The triplet, UUU, is desirable in upstream rather than downstream regions of TIS. These structures may play a role of constructing background structure in TIR. (3) Only two triplets (UAA and UGA) corresponding to the termination codons are desirable in the shifted reading frames downstream of TIS, suggesting that release factors may be also involved in translation initiation because only the two triplets correspond to these factors.

Author

Principal Components Analysis; Genes; Genetic Code; Nucleotides; Escherichia

19990009305 Houston Univ., TX USA

RNA Research Final Report, 1 Dec. 1996 - 31 Jan. 1998

1998; 13p; In English

Contract(s)/Grant(s): NAG5-4004; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

It is generally believed that an RNA World existed at an early stage in the history of life. During this early period, RNA molecules are seen to be potentially involved in both catalysis and the storage of genetic information. It is widely believed that this RNA World was extensive and therefore a sophisticated nucleic acid replication machinery would presumably predate the translation machinery which would not be needed until later stages in the development of life. This view of an extended RNA World is not necessarily correct. From the point of view of exobiology, the difference in these two views mainly affects the significance of studies of the extent of catalysis possible by RNA. In either case, the origin of the translation machinery and the principles of RNA evolution remain central problems in exobiology. Translation presents several interrelated themes of inquiry for exobiology.

First, it is essential, for understanding the very origin of life, how peptides and eventually proteins might have come to be made on the early Earth in a template directed manner. Second, it is necessary to understand how a machinery of similar complexity to that found in the ribosomes of modern organisms came to exist by the time of the last common ancestor (as detected by 16S rRNA sequence studies). Third, the RNAs that comprise the ribosome are themselves likely of very early origin and studies of their history may be very informative about the nature of the RNA World. Moreover, studies of these RNAs will contribute to a better understanding of the potential roles of RNA in early evolution.

Author

Ribonucleic Acids; Biological Evolution; Exobiology; Genetic Code

19990009311 Institute of Space Medico-Engineering, Beijing, China

Effect of Heat, Noise and Their Combination on Plasma and Myocardial Angiotensin II in Rats

Ma, Guixi, Institute of Space Medico-Engineering, China; Qin, Shizhen, Institute of Space Medico-Engineering, China; Yu, Qifu, Institute of Space Medico-Engineering, China; Zhao, Yuntao, Institute of Space Medico-Engineering, China; Hao, Weiwei, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 23-25; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Effects of heat (40 C, relative humidity 82%), noise (115 dB) and the combination of heat and noise on angiotensin (A II) content in plasma and myocardia was observed in rats. The results showed: (1) plasma A II in control group, heat group, noise group and combined group were 358.72 +/- 35.78, 624.08 +/- 36.32, 783.27 +/- 34.32 and 619.65 +/- 37.72 pg/ml respectively. The A II content in heat group, noise group and combined group are significantly higher than that of the control group ($P < .01$). The increase in noise group was significant as compared with those in the heat group and combined group ($P < 0.05$); (2) the myocardia A II in control group, heat group, noise group and combined group were 594.78 +/- 82.46, 935.10 +/- 151.51, 326.22 +/- 28.45, and 438.37 +/- 58.63 pg/mg W. W respectively. The myocardial A II content in heat group was significantly higher ($P < 0.01$), but that in noise group than the control was significantly lower ($P < 0.05$).

Author

Humidity; Heat Tolerance; High Temperature Environments; Physiological Effects; Noise Tolerance; Blood Plasma

19990009460 California Univ., Riverside, CA USA

Three-Dimensional Structure Determination of Botulinum Toxin Annual Report, 1 Aug. 1997 - 30 Jun. 1998

Stevens, Ray C., California Univ., USA; Jul. 1998; 60p; In English

Contract(s)/Grant(s): DAMD17-93-C-3118

Report No.(s): AD-A355181; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The immediate goals of the contract on the structure and function relationship of botulinum neurotoxin are: 1) Determine the three-dimensional structure of botulinum neurotoxin at atomic resolution by x-ray crystallography. 2) Based on the structure of the neurotoxin, understand the toxins mechanism of action. We have accomplished the first goal of determining the three-dimensional structure of the 150 kD botulinum neurotoxin serotype A. The toxin is Y-shaped, with a very long alpha-helical translocation domain forming the backbone of the structure. The translocation domain is composed almost entirely of helices, 2 of which are 95 A in length and form a pseudo-coiled coil. The binding domain and catalytic domain are more globular in shape, located at two different ends of the translocation domain. The overall dimensions of the protein are 120 A x 80 A x 40 A. A complete description of the three-dimensional structure is described in the report (the manuscript will be published in the September issue of Nature Structural Biology). We have recently collected data on an inhibitor complex and a receptor - complex. Refinement and analysis of the toxin with bound molecules will be completed within the next 12 months.

DTIC

X Rays; Toxins and Antitoxins; Crystallography; Clostridium Botulinum; Three Dimensional Models

19990009675 Universite Catholique de Louvain, Lab. de Chimie Physique et de Cristallographie, Belgium

Crystal Structure Analysis of the Bacteriophage Lambda Lysozyme, Experiment 18

Declercq, Jean-Paul, Universite Catholique de Louvain, Belgium; Evrard, C., Universite Catholique de Louvain, Belgium; Second USA Microgravity Laboratory: One Year Report; Aug. 1998; Volume 2, pp. 401-404; In English; Also announced as 19990009671; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

The bacteriophage lambda lysozyme is a small protein of 158 amino acids. Like other known lysozymes, it is involved in the dissolution of the cell walls of bacteria. This enzyme is remarkable in that its mechanism of action is different from the classical lysozyme's mechanism; moreover, from the point of view of protein evolution, it shows features of lysozymes from different classes. After many years of efforts toward crystallization of the native enzyme, no suitable crystals could be obtained. Before

this mission, different mutants also were tested, and it appears that the best results were obtained after replacement of the tryptophane residues by aza-tryptophanes, using the hanging drop technique. Investigators were able to grow only very small crystals of this mutant, even after seeding experiments. These crystals were too small for complete structure analysis but allowed determination of preliminary crystallographic data. The aim of this investigation was to produce well-ordered crystals suitable for high-resolution x-ray structure determination and analysis.

Author

Microgravity; Spaceborne Experiments; Bacteriophages; Lysozyme; Crystallization; Diffusion; Protein Crystal Growth

19990009676 Centre National de la Recherche Scientifique, Lab. d'Enzymologie et Biochimie Structurales, Gif-sur-Yvette, France

Crystallization of Monoclinic and Triclinic Lysozyme (APCF Facility), Experiment 19

Broutin, I., Centre National de la Recherche Scientifique, France; Ries-Kautt, M., Centre National de la Recherche Scientifique, France; Ducruix, A., Centre National de la Recherche Scientifique, France; Second USA Microgravity Laboratory: One Year Report; Aug. 1998; Volume 2, pp. 405-414; In English; Also announced as 19990009671; Original contains color illustrations; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Lysozyme has been widely used as a standard protein for protein crystal growth. Lysozyme crystals are extremely polymorphic. Triclinic and monoclinic crystals of lysozyme were grown under a microgravity environment using an APCF instrument during the USML-2 mission. Proper ground controls were performed using different techniques (solution or gel growth) as well as different chemical compositions of a crystallizing agent. Space-grown crystals and ground controls were analyzed using synchrotron radiation to assess their diffraction limits. Ground- and microgravity-grown crystals are isomorphous. The best resolution for ground- and microgravity-grown crystals is the same (1.45 Å) for both crystal forms. Triclinic crystals were only partially recorded for a statistical analysis because ground crystals diffracting to 0.99 Å were already recorded by another group. As for the monoclinic form, because the highest resolution of chicken egg white lysozyme deposited at the PDB is 1.72 Å resolution, it was decided to collect a full data set with microgravity-grown crystals. The structure is under refinement.

Author

Microgravity; Spaceborne Experiments; Protein Crystal Growth; Crystallization; Space Processing; Lysozyme

19990009681 Technische Univ., Inst. fuer Kristallographie, Berlin, Germany

Crystallization of Photosystem I Protein Complex, Experiment 24

Saenger, Wolfram, Technische Univ., Germany; Fromme, Petra, Technische Univ., Germany; Second USA Microgravity Laboratory: One Year Report; Aug. 1998; Volume 2, pp. 455-458; In English; Also announced as 19990009671; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

In all green plants and cyanobacteria, two protein complexes are involved in photosynthesis- photosystem-I and II (PSI and PSII). PSI, from the thermophilic cyanobacterium *Synechococcus elongatus*, consists of 11 polypeptide chains, about 90 chlorophyll a molecules, and three Fe₄S₄ clusters and occurs in vivo as a trimer. PSI has been crystallized, and the x-ray structure analysis has provided an electron density map at 4-Å resolution. The crystals show a large mosaic spread of > 1 deg. It was hypothesized that this large spread could be reduced by growing the crystals in microgravity. The USML-2 PSI crystal growth experiments were conducted in an attempt to reduce the mosaic spread, thereby increasing the resolution of the diffraction data.

Author

Microgravity; Gravitational Effects; Spaceborne Experiments; Bacteria; Protein Crystal Growth; Photosynthesis; Crystallization; Molecules

19990010069

Multianalyte sensor for the simultaneous determination of glucose, L-lactate and uric acid based on a microelectrode array

Frebel, H., Inst. fuer Chemo und Biosensorik e.V., Germany; Chemnitz, G. -C.; Cammann, K.; Kakerow, R.; Rospert, M.; Mokuwa, W.; Sensors and Actuators, B: Chemical; Sep. 1997; ISSN 0925-4005; Volume B43, no. 1-3, pp. 87-93; In English; Copyright; Avail: Issuing Activity

In this work a microelectrode array was used to develop a multianalyte sensor. Glucose, L-lactate and uric acid were chosen as model analytes. The array consists of ten groups of 40 microelectrodes connected in parallel, each of size of 36 x 36 micron. Thus the array showed a large overall current response retaining typical microelectrode features. Single rows of electrodes were modified with enzymes entrapped in a polymer matrix. As the three chosen oxidases were used as enzymes hydrogen peroxide generated by the enzymatic reaction was detected by anodic oxidation at + 800 mV vs. Ag/AgCl/3 M KCl. The elimination of

interfering substances was accomplished by the application of a NAFION membrane between the electrode surface and the enzyme layer.

Author (EI)

Uric Acid; Glucose; Electrochemistry; Electrodes; Proteins; Enzymes; Kinetics; Hydrogen Peroxide

19990010305

ISFET-based dipstick device for protein detection using the ion-step method

Eijkel, J. C. T., Imperial Coll., UK; Olthuis, W.; Bergveld, P.; *Biosensors & Bioelectronics*; 1997; ISSN 0956-5663; Volume 12, no. 9-10, pp. 991-1001; In English; Copyright; Avail: Issuing Activity

A compact and easy-to-operate device for the detection of proteins in solution is described. The device consists of an ISFET pH-sensor in the middle of a Ag/AgCl electrode, on top of which a microporous composite membrane is deposited. The measurement proceeds by offering an ion step and measuring the transient change of the ISFET potential versus the Ag/AgCl electrode. The potential transient is modulated by adsorption of protein to the membrane by incubation in a protein-containing solution. Theory is developed to describe the ISFET potential transient versus the Ag/AgCl electrode starting from the ISFET and Ag/AgCl potential transients versus an external reference electrode. Conditions are formulated under which the Ag/AgCl electrode potential is sufficiently stable to be used as the reference. Both theory and preliminary measurements show that this condition is met under several characteristic measuring conditions. When the internal reference electrode is used, the ion step can be offered simply by manual transference ('dipping') of the device between vessels of different salt concentration instead of by using a complex flow-through set-up. Measurements show a remarkable absence of noise in the potential signal of the dipstick device.

Author (EI)

Bioinstrumentation; Field Effect Transistors; Sensitivity; Proteins; Detectors; pH; Electrochemistry; Electrodes

19990010306

Hydrogen peroxide augmentation in a rat striatum after methamphetamine injection as monitored in vivo by a Pt-disk microelectrode

Yokoyama, Hidekatsu, Inst. for Life Support Technology, Japan; Tsuchihashi, Nobuaki; Kasai, Nahoko; Matsue, Tomokazu; Uchida, Isamu; Mori, Norio; Ohya-Nishiguchi, Hiroaki; Kamada, Hitoshi; *Biosensors & Bioelectronics*; 1997; ISSN 0956-5663; Volume 12, no. 9-10, pp. 1037-1041; In English; Copyright; Avail: Issuing Activity

We fabricated a Pt-disk microelectrode (diameter 30 micron) to conduct differential double-pulse amperometry (first step: 750 mV, 1 s; second step: 1100 mV, 1 s) to detect hydrogen peroxide in the brain of a freely moving animal. This measurement determined hydrogen peroxide (detection limit, 0.03 μ M) without any observable influence from other oxidizable species, such as dopamine (DA), ascorbic acid, or uric acid. The electrode was implanted into the right striatum of a rat. After intraperitoneal injection of methamphetamine (MAP), hydrogen peroxide concentrations were directly detected while the behavioral changes were monitored. MAP injection led to significant augmentation of hydrogen peroxide, the elevation of which depended on the dose of MAP. This is consistent with a previous report on the increase of DA-release caused by amphetamines and indirect evidence of the production of hydrogen peroxide via DA-metabolism.

Author (EI)

Hydrogen Peroxide; Electrical Measurement; Platinum; Electrochemistry; Electrodes; Amines

19990010317

Influence of the branching pattern of the conducting airways on flow and aerosol deposition parameters in the human, dog, rat and hamster

Kaye, S. R., Imperial Coll. of Science, UK; Phillips, C. G.; *Journal of Aerosol Science*; Oct, 1997; ISSN 0021-8502; Volume 28, no. 7, pp. 1291-1300; In English; Copyright; Avail: Issuing Activity

The deposition of aerosols in the lung is a complex process which involves a combination of several physical mechanisms, principally impaction, sedimentation and diffusion. The amount and distribution of deposition depends on the size and density of the particles and on the total inhalation rate. The overall pattern is determined by the levels of deposition at individual airway bifurcations, which in turn depend sensitively on the local branching geometry and air-flow field. Although the dependence on geometry is complex, it is well known that the effects of aerosol properties and inhalation rate on the local deposition mechanisms can be described primarily by just four dimensionless parameters: the Reynolds number (governing air flow), the Stokes number (governing impaction), a sedimentation (or gravitational) parameter and a diffusion parameter. In this paper we employ a diameter-based analysis of published morphometric data to examine how these four parameters vary with airway diameter under a range of conditions. Comparison between data for the human, the dog, the rat and the hamster shows reasonable agreement for the Reynolds and Stokes numbers, but differences between the human and the other species for the parameters governing sedimentation

and diffusion. The predictions of Weibel's commonly used symmetrical model differ greatly from our estimates for all four parameters in the human.

Author (EI)

Flow Characteristics; Aerosols; Deposition; Sediments; Diffusion; Reynolds Number

19990011428

Stereo image analysis for multi-viewpoint telepresence applications

Izquierdo, M. Ebroul, Heinrich-Hertz-Inst. for Communication Technology, Germany; Signal Processing: Image Communication; Jan, 1998; ISSN 0923-5965; Volume 11, no. 3, pp. 231-254; In English; Copyright; Avail: Issuing Activity

An improved method for combined motion and disparity estimation in stereo sequences to synthesize temporally and perspective intermediate views is presented. The main problems of matching methods for motion and disparity analysis are summarized. The improved concept is based on a modified block matching algorithm in which a cost function consisting of feature- and area-based correlation together with an appropriately weighted temporal smoothness term is applied. Considerable improvements have been obtained with respect to the motion and disparity assignments by introducing a confidence measure to evaluate the reliability of estimated correspondences. In occluded image areas, enhanced results are obtained applying an edge-assisted vector interpolation strategy. Two different image synthesis concepts are presented. The first concept is suitable for processing natural stereo sequences. It comprises the detection of covered and uncovered image areas caused by motion or disparity. This information is used to switch between different interpolation and extrapolation modes during the computation of intermediate views. The proposed object-based approach is suitable for processing typical video conference scenes containing extremely large occluded image regions and keeping implementation costs low. A set of stereo sequences has been processed. The performed computer simulations show that a continuous motion parallax can be obtained with good image quality by using sequences taken with stereo cameras having large interaxial distances.

Author (EI)

Image Analysis; Man Machine Systems; Stereoscopic Vision; Image Processing; Edge Detection; Image Resolution

19990011729

Segmentation mechanism in the retina

Tsendrovskii, S. K., S.I. Vavilov State Optical Inst. All-Russia Scientific Cent., Russia; Journal of Optical Technology (A Translation of Opticheskii Zhurnal); Dec, 1997; ISSN 1070-9762; Volume 64, no. 12, pp. 1114-1116; In English; Copyright; Avail: Issuing Activity

Based on a mathematical model developed earlier, a mechanism has been detected by which the edge contrast of an image in the retina of the eye is amplified, and its possible role in segmenting images according to the attribute of contrast has been determined. Examples are given of the use of the model to process a number of test images. It is proposed to use the model for designing a set of components for pattern-recognition optical systems.

Author (EI)

Vision; Image Processing; Image Resolution; Image Analysis; Mathematical Models

19990012927

Rapid SDS-Gel capillary electrophoresis for the analysis of recombinant NADP(+)-dependent formate dehydrogenase during expression in Escherichia coli cells and its purification

Klyushnichenko, V., Heinrich-Heine Univ. Duesseldorf, Germany; Tishkov, V.; Kula, M. -R.; Journal of Biotechnology; Dec 03, 1997; ISSN 0168-1656; Volume 58, no. 3, pp. 187-195; In English; Copyright; Avail: Issuing Activity

The level of expression in Escherichia coli cells and different steps of purification of the recombinant NADP(+)-dependent formate dehydrogenase (EC 1.2.1.2, FDH) from bacterium Pseudomonas sp.101 was analyzed by rapid SDS-Gel capillary electrophoresis (SDS-Gel CE) and compared with SDS polyacrylamide gel electrophoresis (SDS PAGE). First standard proteins were separated in the short capillary and the calibration curve generated, then fractions taken during the fermentation and purification process were analyzed. The main advantages of SDS-Gel CE are short analysis time, high sensitivity, the possibility to quantify proteins at different ultraviolet wavelength, and small injection volumes. The data for each step of the fermentation process and during the purification were controlled by spectrophotometric analysis of enzyme activity and protein concentration as well as standard SDS PAGE. The molecular mass of the purified FDH was determined as 44 078 Da by matrix-assisted laser desorption/ionization time of flight mass spectrometry.

Author (EI)

Cells (Biology); Enzymes; Electrophoresis; Gels; Bacteria; Purification

19990013639 Genometrix, Inc., The Woodlands, TX USA

An Advanced Approach to Simultaneous Monitoring of Multiple Bacteria in Space *Final Report*

Eggers, Mitch, Genometrix, Inc., USA; Mar. 1998; 29p; In English

Contract(s)/Grant(s): NAS5-97183

Report No.(s): NASA/CR-1998-206889; NAS 1.26:206889; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report summarizes the work performed for the program titled "An Advanced Approach to Simultaneous Monitoring of Multiple Bacteria in Space" awarded under Life and Biomedical Sciences and Applications Division NAS5-97183.

Author

Bacteria; Monitors

19990013884

Fabrication of microscopic biosensor arrays without microscopic alignment

Tender, Leonard M., Univ. of New Mexico, USA; Opperman, Kimberly A.; Hampton, Philip D.; Lopez, Gabriel P.; Advanced Materials; Jan 02, 1998; ISSN 0935-9648; Volume 10, no. 1, pp. 73-75; In English; Copyright; Avail: Issuing Activity

A method that enables fabrication of microscopic biosensor arrays consisting of several gold elements modified with self-assembled monolayers (SAMs) formed from different (single or mixtures) adsorbed alkanethiolates is described. The method is based on spatially selective electrochemical desorption of SAMs from gold arrays followed by sequential re-modification of the exposed elements with SAMs formed of different alkanethiolates. The advantage of this method of microscopic array fabrication is that microscopic alignment is not necessary, unlike in photolithographic methods or methods involving direct delivery of chemicals to their target array elements.

EI

Bioinstrumentation; Gold; Monomolecular Films; Desorption

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19990009098 Institute of Space Medico-Engineering, Beijing, China

Preliminary Study on Differentiation of Syndromes During HDT-6 deg Bed Rest with Traditional Chinese Medicine

Wang, Baozhen, Institute of Space Medico-Engineering, China; Shi, Hongzhi, Institute of Space Medico-Engineering, China; Song, Kongzhi, Institute of Space Medico-Engineering, China; Xu, Zhiming, Institute of Space Medico-Engineering, China; Qian, Jinkang, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 59-61; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Differentiation of syndromes during 21 d HDT - 6 deg. bed rest was made in 15 healthy young men. The results indicated that the subjects showed mainly deficiency of kidney-Yin, deficiency of Yin and hyperactivity of Yang, insufficiency of spleen-Qi and blood stasis in various degrees during the bed rest. The syndromes were most serious on the 3rd day, and then deficiency of kidney and deficiency of Yin and hyperactivity of Yang became mild gradually but insufficiency of spleen-qi and blood stasis remained the same. The pulse condition was normal throughout the bed rest period.

Author

Bed Rest; Head Down Tilt; Human Tolerances; Physiological Effects

19990009099 Institute of Space Medico-Engineering, Beijing, China

An Analysis of Dynamic ECG of 36 Pilots

Lin, Hu, Institute of Space Medico-Engineering, China; Zhang, Fusheng, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 65-67; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Twenty four hour dynamic electrocardiogram (DCG) of 36 healthy male fighter pilots, aged 25-35 years were recorded and analyzed, then the data were compared with DCG of 55 normal subjects. The results showed that supraventricular arrhythmias were more than ventricular ones; both supraventricular and ventricular arrhythmias of pilots were more than that of the control; The appearing rate of ST segment depression of pilots was higher.

Author

Electrocardiography; Aircraft Pilots; Heart Function

19990009186 Research Triangle Inst., Research Triangle Park, NC USA

Health Behaviors and Performance of Military Women Annual Report, 15 Sep. 1997 - 14 Sep. 1998

Bray, Robert M., Research Triangle Inst., USA; Murchison, Ashley M., Research Triangle Inst., USA; Walker, June A., Research Triangle Inst., USA; Oct. 1998; 127p; In English

Contract(s)/Grant(s): DAMD17-95-1-5074

Report No.(s): AD-A355566; 6418/AR98; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

Research objectives are to: (a) examine the health of military women in terms of health status, health practices, and health care utilization; (b) assess work-related performance of military women; and (c) examine health and performance of military women. Data are drawn from the six Worldwide Surveys of Substance Abuse and Health Behaviors Among Military Personnel. Year 3 analyses examined interrelationships among stress, substance use, and coping, and compared military women and men and subgroups of military women. Analyses resulted in three papers and four presentations at a professional meeting. Each addressed an aspect of health and military women consistent with the grant's objectives. Specifically, among military women and men, papers examined the relationships between stress and substance abuse; the effects of stress, symptoms of depression, and coping style on occupational impairment, and relationships between deployment and substance abuse. Presentations examined deployment and substance use among military women and men; substance use and injury among military women and men; sources and effects of stress on work performance of military women and men; and the co-occurrence of substance use and other health-risk behaviors among military women and men. Copies of each are included in the appendices to the report.

DTIC

Health; Females; Surveys; Medical Services; Physiology; Human Performance

19990009306 Institute of Space Medico-Engineering, Beijing, China

Integrated Regulation in Response to Simulated Weightlessness

Yang, Guanghua, Institute of Space Medico-Engineering, China; Cui, Wei, Institute of Space Medico-Engineering, China; Sun, Yazhi, Institute of Space Medico-Engineering, China; Qi, Dong, Institute of Space Medico-Engineering, China; Shen, Xianyun, Institute of Space Medico-Engineering, China; Tao, Wang, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 1-5; In English; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

To investigate physiological effects of tail suspension, $G_{a(2)}$ concentration, immune factors, erythrocyte rheological properties, and growth hormone were determined in rats suspended for 15 and 20 d. The results showed that inhibitory changes of both local factors (proteins secreted by bone cell, $Ca^{(2+)}-ATPase$ in sarcoplasmic reticulum) and integrated regulative factors (immune factor, growth hormone) were observed simultaneously with the decrease of bone mineral content, calcium transportation in skeletal muscles as well as erythrocyte deformability. It suggests that both local and integrated regulative processes are functioning in response to the effects of weightlessness.

Author

Weightlessness Simulation; Physiological Effects; Gallium Isotopes; Immunity; Erythrocytes; Musculoskeletal System

19990009307 Institute of Space Medico-Engineering, Beijing, China

Tolerance Limit of Human Head-Neck Region to High Speed Windblast

Zhang, Yunran, Institute of Space Medico-Engineering, China; Wu, Guirong, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 6-10; In English; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

To provide parameters for designers of open type escape systems in an aircraft, aerodynamic and biomechanical characteristics of human head-neck region was studied and analyzed. The results show that tolerance limit of human head-neck region are 2.452 kN, 1.358 kN and 0.169 kN to aerodynamic drag, aerodynamic lift, and aerodynamic side force respectively during high speed windblast. Meanwhile the curve of tolerance limit to high speed windblast is given. Regardless of crewman posture during ejection, human head-neck region is free from windblast injury unless the aerodynamic force exerted on the head-neck region is within the above-mentioned value.

Author

Tolerances (Mechanics); Wind Effects; Biodynamics; Escape Systems; Flight Safety; Impact Damage; Physiology

19990009308 Institute of Space Medico-Engineering, Beijing, China

Application of Fuzzy Graph Theory to Evaluation of Human Cardiac Function

Sun, Hongyuan, Institute of Space Medico-Engineering, China; Wang, Dehan, Institute of Space Medico-Engineering, China;

Zhao, Guoxuan, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 11-13; In English; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

To explore the possibility of application of the fuzzy graph theory to the evaluation of human cardiac function, the cardiac function of two groups of personnel working under special environments were evaluated using the method of fuzzy graph theory. The first group consists of 31 subjects aged 19-21 years. They were classified according to their cardiac function evaluated by the method of maximum support tree. While the second group consists of 24 subjects aged 30-40 years and were classified with fuzzy graph theory on the basis of 6 maximum principal components extracted from 16 physiological indices. Medical explanation of the results is convincing.

Author

Graph Theory; Evaluation; Heart Function; Fuzzy Systems

19990009309 Institute of Space Medico-Engineering, Beijing, China

Observation on Acupoint Electric Potential in Pilots Under Vestibular Stimulation

Yu, Yaorong, Institute of Space Medico-Engineering, China; Tian, Guangqing, Institute of Space Medico-Engineering, China; Gai, Yuqing, Institute of Space Medico-Engineering, China; Hu, Suwei, Institute of Space Medico-Engineering, China; Bai, Gang, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 14-17; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

To study the possibility of using acupoint electric potential as an index for evaluation of pilot's reaction to vestibular stimulation, electric potential was measured on both sides of the left and right Neiguan points and Zusanli points in 80 pilots. A rotation chair was used as the method of stimulator. The results showed that changes of acupoint electric potentials were not significant ($P > 0.05$) during 5 min. uniform rotation. While the changes under head motion stimulation were significant ($P < 0.05$ or 0.01) as compared with the pretest values. Relationship between symptoms and the corresponding acupoint potential changes remain to be studied further.

Author

Electric Potential; Vestibular Tests; Stimulation; Head Movement; Human Reactions; Physiological Effects

19990009310 Institute of Space Medico-Engineering, Beijing, China

A Study on the Counteracting Effect of Hypoxia and Qigong on Simulated Weightlessness and Orthostatic Tolerance after Bedrest

Xie, Jinshui, Institute of Space Medico-Engineering, China; Zhang, Baolan, Institute of Space Medico-Engineering, China; Yan, Xiaoxia, Institute of Space Medico-Engineering, China; Shan, Yi, Institute of Space Medico-Engineering, China; Zhang, Jingxue, Institute of Space Medico-Engineering, China; Wang, Chengmin, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 18-22; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

-6 deg. head down bed rest (-6 deg. HDBR) 21 d were used to simulate weightlessness. 15 healthy male, aged 19-22, were divided into 3 groups with 5 people in each group: control group (-6 deg. HDBR), hypoxia group (-6 deg. HDBR + Low Oxygen), Qigong group (-6 deg. HDBR + Qigong). The results showed that the reduction of weight, perimeter of shank, daily average cardiac output, basal cardiac output and the pulse pressure of the Qigong group were lower than those of the control group ($P < 0.05$). The basal cardiac output and the perimeter of shank of the Hypoxia group reduced significantly more than those of the control group ($P < 0.05$). During head-up tilt (HUT) + 75 deg. 20 min orthostatic tolerance test after HDBR, the parameters in the Hypoxia group were better than those in the other groups. The average standing time was also longer, and no presyncopal symptom occurred.

Author

Hypoxia; Weightlessness Simulation; Orthostatic Tolerance; Bed Rest; Physiological Effects; Human Tolerances

19990009312 Institute of Space Medico-Engineering, Beijing, China

Experimental Study on Increasing Arterial Oxygen Saturation by Healthy Exerciser Under Hypoxia

Zhou, Zhaoan, Institute of Space Medico-Engineering, China; Wu, Xiufeng, Institute of Space Medico-Engineering, China; He, Liqun, Institute of Space Medico-Engineering, China; Gu, Falong, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 26-28; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

The study was carried out among 41 healthy subjects born in Shanghai (Sea level). They were divided into two groups. Group one (10 subjects) was studied at sea level in a hypobaric chamber (3000 m). Group two (31 subjects) was studied in high altitude plateau (Xigatse at 3836 m). Arterial oxygen saturation (SaO_2), Heart Rate (HR), blood pressure (BP) and myocardial oxygen

uptake (MVO₂) were measured noninvasively with Nelloer N - 200 pulse Oxymeter and HEM-812F-Digital Automatic Blood Pressure Monitor. SaO₂ increased significantly (from 87.7 \pm 1.7% to 95.3 \pm 1.0%, $P < 1.0\%$ to 91.8 \pm 0.6%, $P < 0.01$ and from 86.4 \pm 1.0% to 91.8 \pm 0.6%, $P < 0.05$, respectively) by healthy exerciser through 15 min in both groups. After 3 min exercise SaO₂ was still significantly higher than before exercise. Then HR, BP and MVO₂ have not change significantly. The study results suggested that this kind of exerciser may help increasing the SaO₂ and thus could be used to prevent and treat acute hypoxic response to some extent.

Author

Experimentation; Arteries; Blood Pressure; Oxygen; Saturation (Chemistry); Physiological Responses

19990009313 Institute of Space Medico-Engineering, Beijing, China

Analysis of Frequency Domain Correlative Cardiogram (FCG) in 151 Healthy Pilots

Zhao, Yuanhuai, Institute of Space Medico-Engineering, China; Tian, Guangqing, Institute of Space Medico-Engineering, China; Yu, Yaorong, Institute of Space Medico-Engineering, China; Xu, Yafu, Institute of Space Medico-Engineering, China; Liang, Bo, Institute of Space Medico-Engineering, China; Gai, Yuqing, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 29-33; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Frequency domain correlative cardiogram (FCG) is a relatively new noninvasive method for diagnosis of coronary heart disease. However there has been little information about the application of FCG in pilots. To explore whether the FCG diagnostic standards of normal people, can be applied to healthy pilots, 151 male pilots aged 22-47 (mean=30 \pm 6 years) were examined with the HBD - II A instrument manufactured by Hong Kong WEX company. The results showed that the characteristics of FCG graph of the pilots were similar to that of the common healthy men. It indicates that the diagnostic standard of FCG for normal people can be used to pilots, so it might be useful in selection and real-time medical monitoring during ground training.

Author

Cardiograms; Heart Diseases; Diagnosis; Pilots (Personnel)

19990009316 Institute of Space Medico-Engineering, Beijing, China

Tolerance Limit of Human Upper Extremity with Arm Restraint Plate on Eject Seat to Simulated Aerodynamic Loads

Wu, Guirong, Institute of Space Medico-Engineering, China; Zhang, Yunran, Institute of Space Medico-Engineering, China; Liu, Bingkun, Institute of Space Medico-Engineering, China; Zhu, Qingan, Institute of Space Medico-Engineering, China; Lu, Haijun, Institute of Space Medico-Engineering, China; Ouyang, Jun, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 39-43; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

To obtain tolerance limits of the human upper extremity with an arm restraint plate on an ejection seat to windblast, impact was applied to the upper extremity of 13 human corpses and 7 living monkeys by a spring driven impact device. Relationships between impact load, moment of elbow joints and arm injuries with the arm restraint plate were studied. The relationship between the biomechanical characteristic curve of the human elbow joint and clinical injuries was obtained. The results indicated that the tolerance limit of the human upper arm is higher than the forearm. The safety limit of the human anterior arm to simulated aerodynamic load is 1.26 kN.

Author

Human Tolerances; Impact Loads; Blast Loads; Arm (Anatomy); Ejection Seats

19990009318 Institute of Space Medico-Engineering, Beijing, China

Simulation Study on the Blood Volume Feedback Control

Kong, An, Institute of Space Medico-Engineering, China; Bai, Jing, Institute of Space Medico-Engineering, China; Xi, Baoshu, Institute of Space Medico-Engineering, China; Zu, Peizhen, Institute of Space Medico-Engineering, China; Zhou, Xiaoqiang, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 54-58; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

To describe the relationship between blood volume and the cardiac function mathematically, a computer cardiovascular model was developed including a systemic circulation, a heart and a pulmonary model and a blood volume feedback control. Simulation results indicate that the chronic heart failure could be compensated by increasing the blood volume to maintain the proper arterial pressure. Deterioration in heart failure causes an increase in blood volume, as well as increases in heart volume and cardiac energy consumption. These results are in agreement with the clinical data and results reported in the literature. The simulation

also shows that for a predetermined ventricular contractility, an adequate increase in blood volume will increase the heart volume but decrease the cardiac energy consumption and lead the heart to work in an optimum condition.

Author

Computerized Simulation; Cardiovascular System; Blood Volume; Heart Function; Mathematical Models

19990009324 NASA Johnson Space Center, Houston, TX USA

National Space Biomedical Research Institute Annual Report, 1 Oct. 1997 - 30 Sep. 1998

Sep. 30, 1998; 125p; In English

Contract(s)/Grant(s): NCC9-58; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

The National Space Biomedical Research Institute (NSBRI) sponsors and performs fundamental and applied space biomedical research with the mission of leading a world-class, national effort in integrated, critical path space biomedical research that supports NASA's Human Exploration and Development of Space (HEDS) Strategic Plan. It focuses on the enabling of long-term human presence in, development of, and exploration of space. This will be accomplished by: designing, implementing, and validating effective countermeasures to address the biological and environmental impediments to long-term human space flight; defining the molecular, cellular, organ-level, integrated responses and mechanistic relationships that ultimately determine these impediments, where such activity fosters the development of novel countermeasures; establishing biomedical support technologies to maximize human performance in space, reduce biomedical hazards to an acceptable level, and deliver quality medical care; transferring and disseminating the biomedical advances in knowledge and technology acquired through living and working in space to the benefit of mankind in space and on Earth, including the treatment of patients suffering from gravity- and radiation-related conditions on Earth; and ensuring open involvement of the scientific community, industry, and the public at large in the Institute's activities and fostering a robust collaboration with NASA, particularly through Johnson Space Center.

Author

Countermeasures; Gravitation; Human Performance

19990009340 NASA Langley Research Center, Hampton, VA USA

Aerospace Medicine and Biology: A Continuing Bibliography with Indexes, Supplement 480

Dec. 14, 1998; 40p; In English

Report No.(s): NASA/SP-1998-7011/SUPPL480; NAS 1.21:7011/SUPPL480; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report lists reports, articles and other documents recently announced in the NASA STI Database.

Author

Aerospace Medicine; Biology; Bioastronautics; Biofeedback; Gravitational Physiology; Space Adaptation Syndrome

19990009438 Federal Aviation Administration, Technical Center, Atlantic City, NJ USA

Health Hazards of Combustion Products From Aircraft Composite Materials Final Report

Ganhi, Sanjeev, Galaxy Scientific Corp., USA; Lyon, Richard E., Federal Aviation Administration, USA; Sep. 1998; 29p; In English

Report No.(s): AD-A355125; DOT/FAA/AR-98/34; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Concerns about the potential health hazards of burning fiber-reinforced polymer composites in aircraft fires parallel the rising usage of these materials for commercial aircraft primary and secondary structures. An overview of the nature and the potential hazards associated with airborne carbon fibers released during flaming combustion of aircraft composites is presented. The current data derived from animal studies are insufficient to determine the acute toxicity of carbon fibers from burning composites. Further work is needed to examine the adverse health effects of volatile organic chemicals and to assess if any synergistic interactions exist with the fibers.

DTIC

Hazards; Health; Toxicity; Composite Materials

19990009455 Northeastern Univ., Boston, MA USA

Evaluation of Electromagnetic Measurements With Regard to Human Exposure Standards Final Report, Sep. 1994 - Sep. 1995

Sandler, Sheldon S., Northeastern Univ., USA; Sep. 1998; 49p; In English

Contract(s)/Grant(s): F30602-94-C-0288; AF Proj. R468

Report No.(s): AD-A355148; AFRL-IF-RS-TR-1998-181; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The effects of radio frequency (RF) and extremely low frequency (ELF) electromagnetic fields can produce biological effects that can be harmful to human health. Both thermal and field effects are possible. This report estimates the effects of human exposure to electromagnetic fields in four frequency regimes: 60 Hz. (high voltage power lines), 28 KHz. (very low frequency (VLF) communication systems extendible to 10-30 MHz range), and 900 MHz (cellular communication systems). An outline of the approach needed to analyze the 70-144 MHz communication range is given but no results were generated in this effort. The known thermal and non-thermal effects are reviewed. Hazardous exposure situations are investigated including epidemiological studies, laboratory exposure to animals and in vitro studies at the cellular level. Guidelines are suggested for the ELF, VLF and cellular telephone frequencies. The scaling of measurements is discussed along with approximate analytical results. Health standards are presented, and conclusions and recommendations are given. The report also includes an extensive bibliography. Appendix A has an evaluation of government furnished field measurements with regard to IEEE and ANSI standards. Appendix B contains one preprint and three preprints of papers supported by or related to this work.

DTIC

Evaluation; Electromagnetic Measurement; Biological Effects; Electromagnetic Fields; Electromagnetic Properties; Transmission Lines; Exposure; Extremely Low Frequencies; Radio Frequencies

19990009683 Hamburg Univ., Inst. fuer Physiologische Chemie, Germany

Crystallization of the Epidermal Growth Factor (EGF) Receptor, Experiment 26

Weber, Wolfgang, Hamburg Univ., Germany; Second USA Microgravity Laboratory: One Year Report; Aug. 1998; Volume 2, pp. 465-468; In English; Also announced as 19990009671; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

The EGF receptor is the prototype of a family of tyrosine kinase receptors involved in cell growth control. Many human malignancies are characterized by its overexpression. The solution of the EGF receptor structure would pave the way for drug design and novel concepts of therapeutic treatment of tumors; however, the crystal structure of none of the growth factor receptors has been obtained thus far. The difficulty of crystallizing a membrane protein has been overcome by purifying only the hydrophilic external domain of the EGF receptor. Using this ectodomain, the co-crystallization with the ligand EGF was achieved; diffraction of these crystals had been poor, probably because of the high amount of heterogeneous carbohydrate (30 percent of molecular mass). Microgravity conditions have been found to favor crystal growth.

Author

Microgravity; Gravitational Effects; Spaceborne Experiments; Crystallization; Protein Crystal Growth; Membranes; Receptors (Physiology)

19990009748 NASA Langley Research Center, Hampton, VA USA

Aerospace Medicine and Biology: A Continuing Bibliography with Indexes, Supplement 482

Jan. 11, 1999; 29p; In English

Report No.(s): NASA/SP-1998-7011/SUPPL482; NAS 1.21:7011/SUPPL482; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This supplemental issue of Aerospace Medicine and Biology, A Continuing Bibliography with Indexes (NASA/SP-1999-7011) lists reports, articles, and other documents recently announced in the NASA STI Database. In its subject coverage, Aerospace Medicine and Biology concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. Each entry in the publication consists of a standard bibliographic citation accompanied, in most cases, by an abstract.

CASI

Bibliographies; Aerospace Medicine; Exobiology; Bioastronautics; Biological Effects; Indexes (Documentation)

BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19990009144 Hiroshima Junior Coll. of Automotive Engineering, Hiroshima Japan

A Study on Characteristics of Associate Memory in Human Behaviors with a Personal Computer

Munakata, Tsunehiro, Hiroshima-Denki Inst. of Tech., Japan; Takemoto, Tadao, Hiroshima-Denki Inst. of Tech., Japan; Hashimoto, Chutaro, Hiroshima-Denki Inst. of Tech., Japan; Memoirs of Hiroshima-Denki Institute of Technology and Hiroshima Junior College of Automotive Engineering; 1992; ISSN 0286-0562; Volume 25, pp. 85-94; In Japanese; No Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

For researches about factors and elements on decision making in human behavior which is the most principal theme in human factors engineering. It is important to pick up affairs on human memories, especially associative memory and recollection. In this paper, the authors deal with matters of associative memory and recollection of human beings, and they are: (1) used Post lifelike models with 9-bit pattern for associative memory and made an experiment for seminar students to get data from it, and (2) used equations of the relationship between memory and recollection, and investigated data given from the experiment with students using a personal computer. Results of this paper are the following: (1) the ratio of a correct answer on associative memory patterns is generally high, and interesting associative memory patterns which go along the analytic process of Post's associative memory are obtained in cases of 1 sec: 5-3 and 3 sec: 5-2; and regarded as (2) her parts are recollected by the induction from either part A or B in both cases having non-intersections and intersections are certified clearly, and (3) is important in the case of having intersections especially.

Author

Memory; Personal Computers; Human Behavior

19990009314 Institute of Space Medico-Engineering, Beijing, China

Study on the Relationship Between Human Quality and Reliability

Long, Shengzhao, Institute of Space Medico-Engineering, China; Wang, Chunhui, Institute of Space Medico-Engineering, China; Wang, Li, Institute of Space Medico-Engineering, China; Yuan, Jin, Institute of Space Medico-Engineering, China; Liu, Huimin, Institute of Space Medico-Engineering, China; Jiao, Xinyu, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 34-38; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

To clarify the relationship between human quality and reliability, 1925 experiments in 20 subjects were carried out to study the relationship between disposition character, digital memory, graphic memory, multi-reaction time and education level and simulated aircraft operation. Meanwhile, effects of task difficulty and environmental factor on human reliability were also studied. The results showed that human quality can be predicted and evaluated through experimental methods. The better the human quality, the higher the human reliability.

Author

Reliability; Reaction Time; Man Machine Systems; Prediction Analysis Techniques; Human Performance

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19990009218 Massachusetts Univ., Dept. of Computer Science, Amherst, MA USA

Visualization and Modeling for Interactive Plan Development and Plan Steering Final Report, Jul. 1991 - Sep. 1994

Cohen, Paul R., Massachusetts Univ., USA; Aug. 1998; 96p; In English

Contract(s)/Grant(s): F30602-91-C-0076; DARPA ORDER-8136; AF Proj. H136

Report No.(s): AD-A354498; AFRL-IF-RS-TR-1998-168; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

This report describes research to develop a mixed-initiative plan execution system in which an interactive "plan steering" agent assists a human user in keeping an executing military plan on track. In the Interactive Plan Steering (IPS) architecture we developed, a network of demons watches the executing plan looking for pathological states that indicate the plan may be failing in some respect. When a pathology is detected, a Plan Steering Agent (PSA) engages the user in a visual dialogue, altering the user to the pathology and offering advice for steering the plan around it. Experiments show that a human operator working together

with the IPS system outperforms either 1) the human working alone or 2) the IPS system operating without the human's help. A new technique for detecting pathologies during plan execution has been developed under this contract. This technique, called Multi-Stream Dependency Detection (MSDD), examines plan execution traces from multiple sources looking for significant dependencies among actions and effects. MSDD will be useful for plan steering by identifying statistical indicators of pathologies that can be used to trigger demons. It will also prove generally useful for other aspects of planner evaluation, such as identifying unexpected causes of plan failure or unanticipated interaction effects between plan actions.

DTIC

Steering; Pathology; Visual Perception; Management Planning; Human-Computer Interface

19990009317 Institute of Space Medico-Engineering, Beijing, China

A Simulation Study on G Protection Using Tilt-Back Seat

Lu, Hongbing, Institute of Space Medico-Engineering, China; Bai, Jing, Institute of Space Medico-Engineering, China; Zhang, Lifan, Institute of Space Medico-Engineering, China; Space Medicine and Medical Engineering; Feb. 1997; ISSN 1002-0837; Volume 10, No. 1, pp. 49-53; In Chinese; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

A mathematical model of the human cardio-vascular system with cardio-pulmonary interaction was developed based on the previous works of Jaron, Bai jing, et al(1988, 1992). The model of pulmonary circulation was improved and intrathoracic pressure, intra-abdominal pressure and pulmonary alveolar pressure were introduced in the new model. Computer simulation experiments using this model for human relaxed tolerance to rapid onset(1 G/s), gradual onset (0.1 G/s), and high onset (5 G/s) G exposures, at seat back angles of 13 deg, 30 deg, 45 deg, 55 deg, 65 deg, 75 deg, and 85 deg were performed. The simulation results are consistent with the experimental data obtained from reported centrifuge experiments. The tolerance increase by tilt back seat may be attributed to the following three factors: (1) decrease of retinal-aorta hydrostatic distance; (2) decrease of venous pooling in the lower body; and (3) decrease of G onset rate in Z axis.

Author

Mathematical Models; Cardiovascular System; Computerized Simulation; Pulmonary Circulation; Gravitational Effects; Human Tolerances; Sitting Position

19990009319 Naval Postgraduate School, Monterey, CA USA

Design of a Microelectronic Controller with a MIL-STD-1553 Bus Interface for the Tactile Situation Awareness System

Luke, Brian L.; Sep. 1998; 180p; In English

Report No.(s): AD-A354463; No Copyright; Avail: CASI; A09, Hardcopy; A02, Microfiche

Spatial Disorientation (SD) is a triservice aviation problem that costs the Department of Defense more than \$300 million annually in destroyed aircraft and is the primary cause of pilot related mishaps in the Navy and the Air Force. As one solution to the SD problem, the Naval Aerospace Medical Research Laboratory has developed the Tactile Situation Awareness System (TSAS). The primary objective of TSAS is to enhance pilot performance and reduce SD related aircrew/aircraft losses by providing continuous non-visual information using the normally underutilized sensory channel of touch. Using vibrotactile stimulators, TSAS applies information taken from the aircraft's instruments to the pilot's torso. The current implementation of TSAS is a research system that is not compatible with the crowded cockpit of modern aircraft. This thesis presents a design of a microelectronic controller for TSAS compatible with tactical environments. This new system, called the Tactor Interface Microcontroller System (TIMS), incorporates the functionality of the research TSAS into a palm sized microcontroller system and enables TSAS to communicate directly to the computerized sensory and weapons systems in combat aircraft such as the Navy F/A-18. TIMS brings the TSAS prototype out of the research stage and puts this exciting technology into the hands of the warfighter.

DTIC

Aerospace Medicine; Cockpits; Computer Techniques; Control Systems Design; Costs; Defense Program; Disorientation

19990009348 NASA Marshall Space Flight Center, Huntsville, AL USA

A Human Factors Framework for Payload Display Design

Dunn, Mariea C., Southern Univ., USA; Hutchinson, Sonya L., NASA Marshall Space Flight Center, USA; 1998; 7p; In English, 30 Oct. - 1 Nov. 1998, Lexington, KY, USA; Sponsored by Colorado Univ., USA; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

During missions to space, one charge of the astronaut crew is to conduct research experiments. These experiments, referred to as payloads, typically are controlled by computers. Crewmembers interact with payload computers by using visual interfaces or displays. to enhance the safety, productivity, and efficiency of crewmember interaction with payload displays, particular attention must be paid to the usability of these displays. Enhancing display usability requires adoption of a design process that incorpo-

rates human factors engineering principles at each stage. This paper presents a proposed framework for incorporating human factors engineering principles into the payload display design process.

Author

Display Devices; Human Factors Engineering; Payloads; Spacecrews

19990010028 East Carolina Univ., School of Human Environmental Sciences, Greenville, NC USA

Object Creation and Human Factors Evaluation for Virtual Environments

Lindsey, Patricia F., East Carolina Univ., USA; Sep. 1998; 6p; In English; Also announced as 19990010001; No Copyright; Avail: CASI; A02, Hardcopy; A04, Microfiche

The main objective of this project is to provide test objects for simulated environments utilized by the recently established Army/NASA Virtual Innovations Lab (ANVIL) at Marshall Space Flight Center, Huntsville, Al. The objective of the ANVIL lab is to provide virtual reality (VR) models and environments and to provide visualization and manipulation methods for the purpose of training and testing. Visualization equipment used in the ANVIL lab includes head-mounted and boom-mounted immersive virtual reality display devices. Objects in the environment are manipulated using data glove, hand controller, or mouse. These simulated objects are solid or surfaced three dimensional models. They may be viewed or manipulated from any location within the environment and may be viewed on-screen or via immersive VR. The objects are created using various CAD modeling packages and are converted into the virtual environment using dVise. This enables the object or environment to be viewed from any angle or distance for training or testing purposes.

Derived from text

Human Factors Engineering; Virtual Reality; Environment Simulation; Man Machine Systems

19990013380

Drinking water quality monitoring

Mil'ner, A. A., Goszhilkommunkhoz Ukrainy, Ukraine; Reznikov, G. D.; Khimiya i Tekhnologiya Vody; Jan-feb, 1996; Volume 18, no. 1, pp. 83-87; In Russian; Copyright; Avail: Issuing Activity

A conception of the departmental monitoring of the drinking water quality in Ukraine is described. Organization structure of control system is considered that has three levels of monitoring. The lower levels are to be taken an interest in an information incoming from the upper levels for the monitoring viability. An importance of this information raises especially in crisis monitoring under conditions of emergency ecological situations.

EI

Potable Water; Water Quality; Chemical Analysis; Water; Surface Water

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Report Documentation Page

1. Report No. NASA/SP—1998-7011/SUPPL484	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Aerospace Medicine and Biology A Continuing Bibliography (Supplement 484)		5. Report Date February 8, 1999	
		6. Performing Organization Code	
7. Author(s)		8. Performing Organization Report No.	
9. Performing Organization Name and Address NASA Scientific and Technical Information Program Office		10. Work Unit No.	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Langley Research Center Hampton, VA 23681		13. Type of Report and Period Covered Special Publication	
		14. Sponsoring Agency Code	
15. Supplementary Notes			
16. Abstract This report lists reports, articles and other documents recently announced in the NASA STI Database.			
17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects		18. Distribution Statement Unclassified – Unlimited Subject Category – 52	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 32	22. Price A03/HC